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## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : KUBOTA CORP

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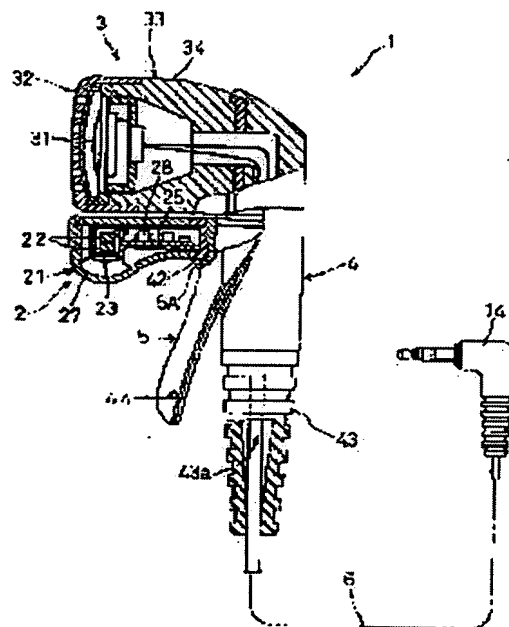
(72)Inventor : FUJITA MASAHIKO  
MATSUDA MUNEHIRO  
ITO ISAO

## (54) SPEECH EQUIPMENT UTILIZING BONE CONDUCTION VOICE SIGNAL

## (57)Abstract:

PROBLEM TO BE SOLVED: To suppress detection of noise by a piezoelectric element to the utmost by configuring a 1st housing with a hard part that supports the piezoelectric element to be in contact with a concha hole and a damping part that is placed toward a base from the hard part to absorb mechanical vibration.

SOLUTION: The speech equipment 1 is provided with a bone conduction voice pickup section 2 to detect a bone conduction voice signal and an earphone section 3 to hear a voice signal of a speech opposite party. The bone conduction voice pickup section 2 is provided with a 1st housing 21 that is in contact with a concha hole of an ear of a person and the earphone section 3 is provided with a 2nd housing 33 containing a reception earphone 31 and mounted in the concha hole. The 1st housing 21 is provided with a hard part 27 that supports a piezoelectric element 22 and is in contact with the concha hole and a damper section 42 that is placed toward a base 4 from the hard part 27 to absorb mechanical vibration.



## LEGAL STATUS

[Date of request for examination]

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## CLAIMS

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[Claim(s)]

[Claim 1] The 1st housing inserted in the condition of contacting the cavum-conchae circles of people's handle part with it, The bone conduction voice pickup section equipped with the piezoelectric device which detects the bone conduction voice which is contained in the 1st housing and gets across to said handle part, It is contained in the 2nd housing inserted in said cavum-conchae circles, and its 2nd housing. the earphone section equipped with the earphone for receivers which emits voice to said method side of the inside of a handle part prepares -- having -- said 1st housing and said 2nd housing -- two forks -- so that it may become a \*\* It is message equipment of the bone conduction voice use constituted so that the base which supports them may be prepared and the signal cable of said piezoelectric device and said earphone for receivers may be held in said base. Said 1st housing is message equipment of

the bone conduction voice use constituted by having the hard section which contacts said cavum-conchae section in support of said piezoelectric device, and the vibration-deadening section which is located in said base side and absorbs mechanical oscillation rather than the hard section.

[Claim 2] Message equipment of bone conduction voice use according to claim 1 with which said vibration-deadening section consists of viscoelastic bodies.

[Claim 3] Said signal cable is message equipment of the bone conduction voice use according to claim 1 or 2 by which elastic support is carried out to said base.

[Claim 4] Message equipment of bone conduction voice use given in any 1 term of claims 1-3 equipped with the vibration-deadening section for earphones which absorbs mechanical oscillation in support of said earphone for receivers in said 2nd housing.

[Claim 5] Message equipment of bone conduction voice use according to claim 4 with which said vibration-deadening section for earphones consists of metals.

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#### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] The 1st housing inserted in the condition that this invention contacts the cavum-conchae circles of people's handle part with it, The bone conduction voice pickup section equipped with the piezoelectric device which detects the bone conduction voice which is contained in the 1st housing and gets across to said handle part, It is contained in the 2nd housing inserted in said cavum-conchae circles, and its 2nd housing. the earphone section equipped with the earphone for receivers which emits voice to said method side of the inside of a handle part prepares -- having -- said 1st housing and said 2nd housing -- two forks -- so that it may become a \*\* The base which supports them is prepared and it is related with the

message equipment of the bone conduction voice use constituted so that the signal cable of said piezoelectric device and said earphone for receivers may be held in said base.

[0002]

[Description of the Prior Art] The message equipment of this bone-conduction voice use is changing and outputting the bone-conduction voice transmitted to a handle part as vibration to a voice electrical signal from vocal cords in the piezoelectric device contained in the 1st housing, changing into voice the voice electrical signal inputted from the outside by the earphone for receivers contained by the 2nd housing on the other hand, and telling a lug, and is equipment which performs the message with the others. In the message equipment of this bone conduction voice use, if the earphone for receivers and a piezoelectric device are made to approach and are only arranged for miniaturization of equipment, the mechanical oscillation generated by the earphone for receivers is detected by the piezoelectric device, is returned to the other party, and may cause the so-called echo and the so-called howling. for this reason, the 1st housing which contains a piezoelectric device from the former and the 2nd housing which contains the earphone for receivers -- two forks -- the mechanical oscillation generated by the earphone for receivers though it supports to a base so that it may become a \*\*, and miniaturization is attained -- a piezoelectric device -- propagation -- hard -- it is carrying out.

[0003]

[Problem(s) to be Solved by the Invention] however, the above-mentioned former -- a configuration -- like -- the 1st housing and the 2nd housing -- two forks -- when it considered as a \*\*, the piezoelectric device detected the vibration of those other than bone conduction voice, the noise occurred, and there was a case where displeasure was given to a message person. This invention is made in view of the above-mentioned actual condition, and the purpose is that it controls detection of the noise by the piezoelectric device as much as possible.

[0004]

[Means for Solving the Problem] By having the configuration of the claim 1 above-mentioned publication, in the 1st housing, a piezoelectric device can be supported by the hard section in contact with the cavum-conchae section, can detect bone conduction voice exactly, and can control vibration transmitted from a base side to a piezoelectric device in the vibration-deadening section located in a base side rather than the hard section. namely, the result to which the artificer of this invention studied the cause of the noise detected by the piezoelectric device -- the 1st housing and the 2nd housing -- two forks -- a \*\* -- carrying out -- vibration of the earphone for receivers -- a piezoelectric device -- propagation -- being hard -- also as a thing \*\* which vibration generates because the signal cable of a piezoelectric device and the earphone for receivers contacts a user's body etc., may get across to the piezoelectric device of the 1st housing through the base holding a signal cable, and a noise may generate was found out. Furthermore, it found out that a piezoelectric device may vibrate and a noise may

occur also by vibration of big external noise \*\*\*\* signal cables, such as vibration of a whizzing sound by a signal cable cutting a wind in airy locations, such as a home of an electric car, for example and a signal of discharge of an electric car with a whistle. Then, by controlling vibration transmitted from a signal cable to the piezoelectric device of the 1st housing in the vibration-deadening section based on these knowledge, detection of the noise by the piezoelectric device could be controlled as much as possible, and the comfortable message was attained.

[0005] Moreover, the vibration-deadening section which consists of viscoelastic bodies controls vibration transmitted from a signal cable to a piezoelectric device by having the configuration of the claim 2 above-mentioned publication. Since a viscoelastic body absorbs vibration effectively with viscoelasticity, it can control effectively vibration transmitted from a signal cable to a piezoelectric device.

[0006] Moreover, by having the configuration of the claim 3 above-mentioned publication, the base which supports the 1st housing and the 2nd housing carries out elastic support of the signal cable of a piezoelectric device and the earphone for receivers, and holds it. Therefore, transfer of the vibration from a signal cable is controlled by the maintenance of a signal cable itself.

[0007] Moreover, the vibration-deadening section for earphones with which the 2nd housing was equipped absorbs the mechanical oscillation of that in support of the earphone for receivers by having the configuration of the claim 4 above-mentioned publication. therefore, the 1st housing which contains a piezoelectric device and the 2nd HAUJJINGU which contains the earphone for receivers -- \*\* -- two forks -- it can control further it not only considers as a \*\*, but that vibration of the earphone for receivers gets across to a piezoelectric device by having the vibration-deadening section for earphones.

[0008] Moreover, the vibration-deadening section for earphones which consists of metals mainly absorbs the mechanical oscillation of the earphone for receivers in support of the earphone for receivers by having the configuration of the claim 5 above-mentioned publication using the weight of the vibration-deadening section for earphones. namely, from the volume serving as size comparatively on the relation which equips the 2nd housing side with the earphone for receivers Can enlarge weight of the vibration-deadening section for earphones which consists of metals, and, on the other hand, by the 1st housing side with which the volume serves as smallness comparatively By absorbing mechanical oscillation by the vibration-deadening section which consists of viscoelastic bodies, mechanical oscillation shall be rationally absorbable as the whole equipment in consideration of the configuration of the 1st housing and the 2nd housing etc.

[0009]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained

based on a drawing. As shown in drawing 1 and drawing 2, the message equipment 1 of bone conduction voice use is mainly equipped with the bone conduction voice pickup section 2 for detecting bone conduction voice, and the earphone section 3 for hearing a message partner's voice, and is constituted. The 1st housing 21 with which the condition of contacting it in the cavum-conchae section 52 of people's handle part is equipped as shown in the bone conduction voice pickup section 2 at drawing 5 and drawing 6, It is contained in the 1st housing 21, and has the piezoelectric device 22 which detects the bone conduction voice which gets across to a handle part. On the other hand, in the earphone section 3 It is contained in the 2nd housing 33 with which it is equipped in the cavum-conchae section 52, and its 2nd housing 33, and has the earphone 31 for receivers which emits voice to the method side of the inside of a handle part. the 1st housing 21 and the 2nd housing 33 are shown in drawing 1 etc. -- as -- them -- two forks -- supported by the base 4 so that it may become a \*\*, the base 4 holds the signal cable 6 of a piezoelectric device 22 and the earphone 31 for receivers.

[0010] It has the hard section 27 which holds a piezoelectric device 22 and contacts the cavum-conchae section 52, and the vibration-deadening section 42 which is located in a base 4 side and absorbs mechanical oscillation rather than the hard section 27, and the 1st housing 21 is constituted, as shown in drawing 3 (b) which is the top view of drawing 1 and the 1st housing 21. Broad partial 21A by the side of the tip which becomes broad by plane view and contacts the cavum-conchae section 52 as the hard section 27 is shown in drawing 3, The field which consists of narrow partial 21B which is formed successively by the broad partial 21A and becomes narrow by plane view, and contacts pars-basilaris-ossis-occipitalis 52A of the cavum-conchae section 52 among broad partial 21A By the depth directional vision of external auditory meatus 51, it is formed in the base side of the cavum-conchae section 52 on a convex curved surface, and the touch area with the cavum-conchae section 52 is enlarged.

[0011] The ingredient which is for example, polyamide system resin or ABS plastics, is hard in order to transmit a feeble vibration of the cavum-conchae section 52 to a piezoelectric device 22 correctly, and is easy to hold humidity is used for the quality of the material of the hard section 27. Moreover, the contact front face with the skin is ground in the shape of a mirror plane, and is raising adhesion with the skin. The vibration-deadening section 42 can control degradation of the S/N ratio by the vibration, even when it was formed with viscoelastic bodies, such as rubber material of 50 degrees, and a vinyl chloride, from the degree of hardness 30, and it has controlled that vibration is transmitted from a base 4 to a piezoelectric device 22, a signal cable 6 considers contact etc. as other objects and vibration occurs.

[0012] In broad partial 21A of the hard section 27, as shown in drawing 3 (b) which are drawing 1 and the A-A sectional view of drawing 3 (b) It has free [ vibration ] by fixed support of the piezoelectric device 22 being carried out in the end of a longitudinal direction. To narrow partial

21B The circuit board 25 in which the field effect transistor 26 electrically connected with a piezoelectric device 22 was carried is contained so that it may become circuitry shown in drawing 4 , a piezoelectric device 22 and the whole circuit board 25 are covered with a shielding case 23, and the improvement of a S/N ratio is aimed at. Immobilization between a piezoelectric device 22, a shielding case 23, and 1st housing 21 each is made firm as much as possible, in order to reduce the transfer loss of vibration.

[0013] It has the vibration-deadening section 34 for earphones which consists of metals with comparatively large specific gravity, such as brass and iron, and is constituted, the earphone 31 for receivers attaches in opening of the vibration-deadening section 34 for earphones, and is supported, and the 2nd housing 33 is attached in the vibration-deadening section 34 for earphones so that the protector 32 which protects this earphone 31 for receivers may cover the front face of the earphone 31 for receivers further.

[0014] The base 4 which supports the 1st housing 21 and the 2nd housing 33 of the above-mentioned configuration is formed with the hard ingredient rather than the vibration-deadening section 42. Moreover, the base 4 is equipped with the pinching member 5 which pinches the edge of the cavum-conchae section 52 between the 1st housing sections 21 of a projection downward in the wearing posture to a handle part 50 as shown in drawing 1 and drawing 6 . The pinching member 5 shall be formed with the ingredient which has elasticity, such as rubber material of 59 to 80 degrees of hardness, and a vinyl chloride, and shall pinch the edge of the cavum-conchae section 52 certainly.

[0015] The weight wearing hole 44 for equipping with weight is formed in the lower limit location of this pinching member 5, and as shown in drawing 6 , weight 45 is hung through yarn to this weight wearing hole 44. Contact pressure with the base of the bone conduction pickup section 2 and the cavum-conchae section 52 becomes high according to the load of this weight 45, and bone conduction voice is not influenced of the hair of the skin etc., but transmits bone conduction voice to a piezoelectric device 22 certainly. Moreover, the configuration of weight 45 can use various things, exchanges them suitably according to liking and epidemia of a user, and is applicable to improvement in fashionability.

[0016] A base 4 holds the signal cable 6 into which the wiring 46 and 47 with the piezoelectric device 22 and the earphone 31 for receivers which are shown in drawing 4 was packed in the taper-like pipe section 43 of that. As shown in drawing 1 , cable path 43a in which a signal cable 6 is inserted the taper-like pipe section 43 Since it is formed in the shape of [ which serves as a taper towards the method side of outside (lower part side in drawing 1 ) by side view ] a taper and a pressure welding is carried out to a signal cable 6 in the way side edge section (lower limit section in drawing 1 ) outside cable path 43a In the back side (upper part side which can set drawing 1 ) of cable path 43a, a base 4 and a signal cable can estrange, the touch area of a base 4 and a signal cable 6 can be reduced, and transfer of vibration can

be controlled. Moreover, the taper-like pipe section 43 is formed with the ingredient which has elasticity, such as a vinyl chloride, a signal cable 6 becomes that by which elastic support is carried out to a base 4, and transfer of the vibration to a piezoelectric device 22 from a signal cable 6 is controlled also at this point. In addition, the external surface of the taper-like pipe section 43 changed the path periodically, was formed, and has prevented that a signal cable 6 is crooked.

[0017] When using it, equipping the cavum-conchae section 52 of a handle part 50 with the message equipment 1 of bone conduction voice use of the above-mentioned configuration As shown in drawing 5 and drawing 6 , the bone conduction voice pickup section 2 contacts pars-basilaris-ossis-occipitalis 52A of the cavum-conchae section 52. You make it located so that the earphone section 3 may carry out an abbreviation confrontation at opening of external auditory meatus 51, and the edge of the cavum-conchae section 52 and a twist concrete target are made to pinch the extension part between a tragus 53 and the antitragus 54 by the bone conduction voice pickup section 2 and the pinching member 5. Pars-basilaris-ossis-occipitalis 52A of the cavum-conchae section 52 which the bone conduction voice pickup section 2 contacts is most suitable for vocal cords within the cavum-conchae section 52 catching exactly vibration generated in near and vocal cords.

[0018] In the condition of having been equipped as mentioned above, the center of gravity of the bone conduction voice pickup section 2 and the earphone section 3 is located in a way side among the cavum-conchae sections 52 rather than supporting point 5A of the pinching member 5, and the load of the bone conduction voice pickup section 2 and the earphone section 3 acts in the direction of a pars basilaris ossis occipitalis of the cavum-conchae section 52. Therefore, it sets into the wearing posture to the above-mentioned cavum-conchae section 52. The whole abbreviation for the bone conduction voice pickup section 2 and a part of earphone section 3 are covered with a tragus 53 and the antitragus 54. The bone conduction voice pickup section 2 Contact maintenance is exactly carried out by the load of the bone conduction voice pickup section 2 which acts in the force from this tragus 53 and the antitragus 54, and the direction of a base of the cavum-conchae section 52, and the earphone section 3, the pinching force between the pinching members 5, and the load of weight 45 on the base of the cavum-conchae section 52. In addition, weight 45 is unnecessary, when required contact force is secured even when it has set up so that it may become the range of 2 to about 20g, and he has no weight 45 since the contact force of the bone conduction pickup section 2 and the cavum conchae section 52 will become what gives a user displeasure if not much large although it needs to be sufficient magnitude to eliminate the effect of the irregularity of the skin leading to [ of contact ] inhibition, or the hair of the skin.

[0019] In the condition of having equipped with message equipment 1 as mentioned above, if a user holds conversation with the other party of a message, vibration of the vocal cords by the



utterance will transmit a skull etc., will arrive at the front face of the cavum-conchae section 52, will vibrate the 1st housing 21, and will be detected by the piezoelectric device 22. The bone conduction voice detected by the piezoelectric device 22 is told to the other party of a message via the communication equipment to which the plug 14 of a signal cable 6 and a signal cable 6 is connected and which is not illustrated, after being changed into an electrical signal and making impedance conversion etc. a field effect transistor 26. On the other hand, it is transmitted from a partner's communication equipment, and the voice which the other party uttered is told to the earphone 31 for receivers via the communication equipment and the signal cable 6 which are not illustrated, is changed into voice, and is emitted to external auditory meatus 51. Conversation is made where the effect of the external noise is reduced between a user and both of the other party of a message by this actuation of a series of.

[0020] [Another operation gestalt] Another operation gestalt of this invention is listed hereafter.

\*\* Although the viscoelastic body constitutes the vibration-deadening section 42 with which the 1st housing 21 of the bone conduction voice pickup section 2 is equipped from the gestalt of the above-mentioned implementation, a member with strong elasticity, such as a flat spring, may constitute, for example.

\*\* Although the metal constitutes the vibration-deadening section 34 for earphones with which the 2nd housing 33 of the earphone section 3 was equipped from the gestalt of the above-mentioned implementation, you may constitute from viscoelastic bodies, such as rubber material and a vinyl chloride.

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#### DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The fragmentary sectional view by the side view of the message equipment of the bone conduction voice use concerning the gestalt of operation of this invention

[Drawing 2] The front view of the message equipment of the bone conduction voice use concerning the gestalt of operation of this invention

[Drawing 3] The enlarged drawing of the bone conduction voice pickup section concerning the gestalt of operation of this invention

[Drawing 4] The circuitry Fig. concerning the gestalt of operation of this invention

[Drawing 5] The explanatory view of the wearing condition concerning the gestalt of operation of this invention

[Drawing 6] The explanatory view of the wearing condition concerning the gestalt of operation of this invention

[Description of Notations]

2 Bone Conduction Voice Pickup Section

4 Base

6 Signal Cable

21 1st Housing

22 Piezoelectric Device

27 Hard Section

31 Earphone for Receivers

33 2nd Housing

34 Vibration-Deadening Section for Earphones

42 Vibration-Deadening Section

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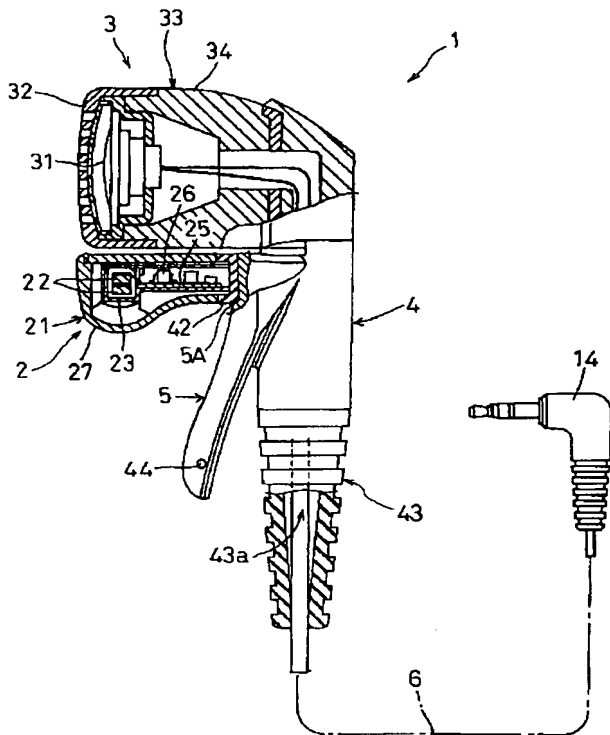
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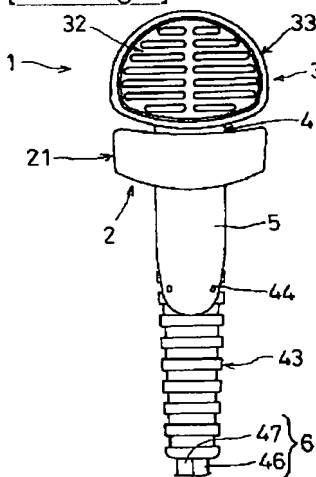
DRAWINGS

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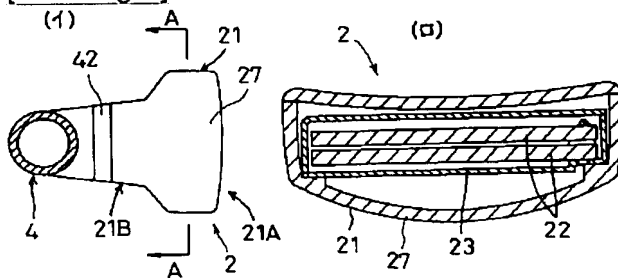
[Drawing 1]



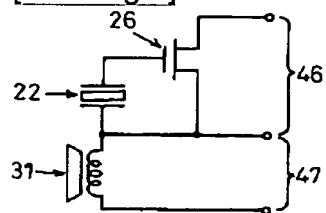
[Drawing 2]



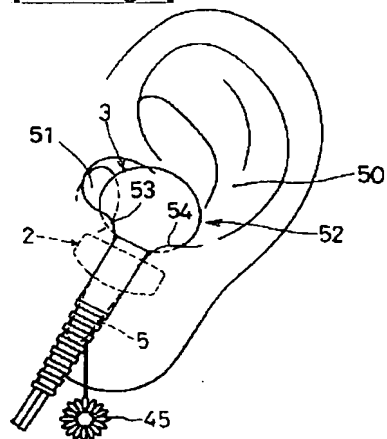
[Drawing 3]



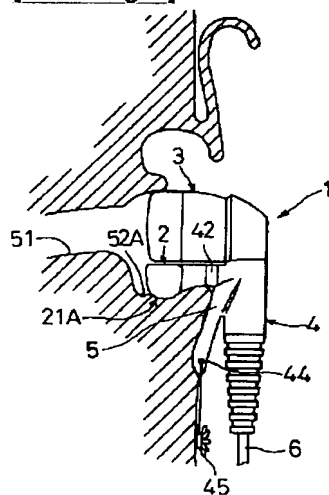
[Drawing 4]



[Drawing 5]



[Drawing 6]



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